RTCA Special Committee 186, Working Group 3

ADS-B 1090 MOPS, Revision A

Meeting #10

Action Item 9-1
Summary of WG-6 Issues Papers and Proposed Changes to DO-242A
in an effort to determine impact on DO-260A

Presented by Stuart Searight, FAA Technical Center

SUMMARY
The following contains a status of each Issue Paper considered by Working Group 6 during the creation of the draft DO-242A to be presented in SC-186 Plenary in April. Additionally, I have attached a Change Summary in an effort to allow WG-3 to determine impact of each potential DO-242A change on the proposed DO-260A.

IP#	Current Status	IP Author	Last Action	Description	Text	Section
01	Rev A (completed)	Stephen Heppe, ADSI, Inc	2/22/01	Turn indication is problematic and should be deleted as a required ADS-B message element.	YES (Draft DO-242A)	2.1.2.2, 2.1.2.2.3, Tables 2-2, Table 2-4a, 3.2.1.1, Table 3-5, 4.0
02	Rev A (completed)	Stephen Heppe, ADSI, Inc	2/22/01	Altitude rate is problematic and should be deleted as a required ADS-B message element.	YES (Draft DO-242A)	2.1.2.8 3.4.3.16
03	CLOSED (IP46)	Stephen Heppe, ADSI, Inc	8/30/01	Effective received reporting rates should be adjusted to match operational requirements.	-------	-------
04	Rev A (completed)	Gary Livack, FAA	2/22/02	Request that ownship's make and model or aircraft size characteristic be broadcast.	YES (Draft DO-242A)	2.1.2.3, 3.4.4.6 Appendix P
05	Rev A (completed)	Gary Livack, FAA	2/22/02	Requirements needed to provide anonymity protection for GA aircraft.	YES (Draft DO-242A)	2.1.2.2.2.2
06	Rev A (completed)	Gary Livack, FAA	2/01/02	Broadcasting of information from moving and stationary obstacles in and around airports.	YES (Draft DO-242A)	2.1.2.2.3 3.4.4.5
07	REJECTED	Gary Livack, FAA	1/25/01	Request to broadcast additional information for future use not currently specified in ADS-B MASPS message set.	-------	-------
08	Rev A (completed)	James Maynard, UPS-AT	2/01/02	Current NUC definition is insufficient. Accuracy and integrity need to be separate components.	YES (Draft DO-242A)	2.1.2.12 – 2.1.2.15, 3.4.3.18, 3.4.4.11 – 3.4.4.13
09	CLOSED (IP37)	Chris Moody, Mitre/CAASD	5/24/01	Use of velocity subtypes 3 and 4.	-------	-------
10	REJECTED	Chris Moody Mitre/CAASD	5/24/01	Are VFR/IFR distinctions on data source requirements proper?	-------	-------
11	CLOSED (IP21)	Bob Hilb, UPS	5/24/01	Request for clarification on "TCP Types" and the use of the "TCP Data Valid" subfield.	-------	-------
12	Rev A (completed)	Bob Hilb, UPS	2/22/02	Request that an aircraft's CDTI and TCAS/ACAS capabilities and TCAS/ACAS RA information be broadcast as part of the ADS-B message Mode Status reports.	YES (Draft DO-242A)	2.1.2.10, 2.1.2.11, 3.4.4.9, 3.4.4.10
13	DEFERRED	Rick Cassell, Rannoch Corp.	10/26/01	ADS-B transmission rates while on airport surface.	-------	-------
14	Rev A (completed)	Rick Cassell, Rannoch Corp.	2/22/02	Use of a "certified navigation center" with own position.	YES (Draft DO-242A)	2.1.2.5,

IP#	Current Status	IP Author	Last Action	Description	Text	Section
15	REJECTED	Stephen Heppe, ADSI, Inc	2/28/01	Effective received update rate versus altitude differential.	------- (AI 3-9)	-------
16	DEFERRED	Stephen Heppe, ADSI, Inc	2/28/01	State Vector reporting rate requirements for users transmitting TCPs	-------	-------
17	REJECTED	Stephen Heppe, ADSI, Inc	2/28/01	Use of TIS-B for integrity enhancement	-------	-------
18	Rev A (completed)	Gary Livack, FAA	2/22/02	Request to broadcast own aircraft's heading at Vstop.	YES (Draft DO-242A)	2.1.2.9, 3.4.3.12, 3.4.3.13
19	DEFERRED	Gary Livack, FAA	8/30/01	Runway incursion alerting	------- (AI 7-17)	-------
20	CLOSED	Chris Moody, Mitre/CAASD	2/13/01	Ambiguity of velocity subtypes.	-------	-------
21	CLOSED (IP26)	Tony Warren, Boeing	10/26/01	TCP Types and parameters to represent Trajectory Change segments.	-------	-------
22	Rev A (completed)	Gary Livack, FAA	2/22/02	Means to ensure backwards compatibility with deployed ADS-B systems.	YES (Draft DO-242A)	3.4.4.3
23	CLOSED (IP32)	Gary Livack, FAA	5/24/01	Ability to broadcast capability to perform specific applications.	-------	-------
24	CLOSED (IP8)	Gary Livack, FAA	5/24/01	NAC functions for surface movement applications	-------	-------
25	DEFERRED	Gary Livack, FAA	5/24/01	Military formation flying message set.	-------	-------
26	Rev A (completed)	Richard Barhydt, NASA	3/08/02	Format for incorporating Short- and Long-Term Intent Information.	YES (Draft DO-242A)	2.1.2.19, 3.3.3.1.4, 3.4.8, 3.4.9
27	CLOSED (IP37)	Richard Barhydt, NASA	5/24/01	Benefits of including Heading and Airspeed in State Vector Report.	-------	-------
28	CLOSED (IP37)	Stephen Heppe, ADSI, Inc	5/24/01	Air-referenced parameters should be excluded from normal/default State Vector transmissions.	-------	-------
29	REJECTED (IP42)	Stephen Heppe, ADSI, Inc	8/30/01	The MASPS should not require geometric altitude in all SV reports.	-------	-------
30	DEFERRED	Stephen Heppe, ADSI, Inc	7/19/01	Proposed clarification for definition of ADS-B	-------	-------

IP#	Current Status	IP Author	Last Action	Description	Text	Section
31	CLOSED (IP26)	Tony Warren, Boeing	5/24/01	TCP Update Rate Requirements	-------	-------
32	Rev A (completed)	James Maynard, UPS-AT	2/22/02	Revise capability code definition	YES (Draft DO-242A)	2.1.2.10 3.4.4.9
33	Rev A (completed)	James Maynard, UPS-AT	2/22/02	Re-organize the SV and MS report elements	YES (Draft DO-242A)	3.4.3, 3.4.4
34	DEFERRED	James Maynard, UPS-AT	2/22/02	Provide standard, data-link-independent, report structure format in the MASPS.	-------	-------
35	Rev A (completed)	Bill Harman, MIT LL	2/01/02	Delete or change note 7 of Table 3-4 to assure that this note does not change or supercede the requirements defined in Table 3-4.	YES (Draft DO-242A)	Table 3-4a
36	Rev A (completed)	Gene Wong, FAA	2/22/02	Simultaneous Parallel Approach Ranges	YES (Draft DO-242A)	Tables 2-4a & 3-1
37	Rev A (completed)	Richard Barhydt, NASA	3/08/02	Air Reference Velocity Vector (IPs 9, 27, 28, and 3X)	YES (Draft DO-242A)	3.4.7 Appendix Q
38	Rev A (completed)	Gary Livack, FAA	2/22/02	Determination of Airborne and On-Ground States	YES (Draft DO-242A)	3.4.3.1
39	Rev A (completed)	Gary Livack, FAA	2/22/02	Does the vertical height integrity (NIC) value need to be the same as the horizontal integrity level so suitably equipped aircraft can perform ACM functions against ADS-B equipped TARGET aircraft?	YES (Draft DO-242A)	2.1.2.16, 2.1.2.17, 3.4.4.14, 3.4.4.15
40	REJECTED	Gary Livack, FAA	5/24/01	Edit text of the ADS-B MASPS (DO-242), as needed, to embrace the notion that ADS-B application enabling software, at the discretion of the applicant, can be treated as discrete, modular software.	-------	-------
41	Rev A (completed)	Bill Flathers, AOPA	2/22/02	Emergency Locator Transmitters Functionality for General Aviation	YES (Draft DO-242A)	3.4.4.7
42	WITHDRAWN (Bill Flathers)	Bill Flathers, AOPA	8/30/01	GA transponder encoder and self-test feature	-------	-------
43	WITHDRAWN (Bill Flathers)	Bill Flathers, AOPA	8/30/01	The Need for "Aircraft Address" in Very Dense Environments	-------	-------
44	DEFERRED	Tony Warren, Boeing	2/22/92	Data source appendix	-------	-------
45	CLOSED (IP26)	Richard Barhydt, NASA	8/16/01	Short term intent parameters	-------	-------

IP#	Current Status	IP Author	Last Action	Description	Text	Section
46	Rev A (completed)	Jonathan Hammer, Mitre/CAASD	2/22/02	Revise Table 3-3 and 3-4 to better reflect range dependency of requirements rather than application dependency.	YES (Draft DO-242A)	3.2.3.1, Table 3-1, Table 3-3(a), Table 3-3(b), Table 3-4
47	Rev A (completed)	Jonathan Hammer, Mitre/CAASD	8/30/01	Add approach spacing intent information as an additional example in Appendix M.	YES (Draft DO-242A)	Appendix M M.3
48	DEFERRED	Tom Foster, Rockwell Collins	2/01/02	Shared Services Links	-------	-------
49	DEFERRED	Stuart Searight, FAA WJHTC	2/01/02	On-Condition Request for Information Report	-------	-------
50	DEFERRED	Stuart Searight, FAA WJHTC	2/22/02	Clarification of coast intervals and target acquisition times	-------	-------
51	DEFERRED	Chris Moody, Mitre/CAASD	2/01/02	Request for "Privacy Mode", or ability to use temp address to de-identify a/c to everyone but ATC	-------	-------
52	Rev A (completed)	Chris Moody, Mitre/CAASD	2/22/02	IDENT transponder-like feature	YES (Draft DO-242A)	2.1.2.11, 3.4.4.10.2
53	Rev A (completed)	Chris Moody, Mitre/CAASD	2/22/02	Ability to identify a/c not flying under ATC control (squawk 1200)	YES (Draft DO-242A)	2.1.2.11, 3.4.4.10.3
54	Rev A (completed)	Chris Moody, Mitre/CAASD	2/22/02	Ability to inhibit broadcast of invalid altitude data	YES (Draft DO-242A)	2.1.2.6
55	Rev A (completed)	Stan Jones, Mitre/CAASD	2/2202	User Population Requirements	YES (Draft DO-242A)	3.3.3.1.1 3.3.3.1.2 3.3.3.1.3 3.3.3.1.4
56	Rev A (completed)	Stuart Searight, FAA WJHTC	2/22/02	Delete "Surveillance Support Code" from Mode Status Report	YES (Draft DO-242A)	3.4.4
57	DEFERRED	Stephen Heppe, ADSI, Inc	2/22/02	Deletion of NACV = 4 category	-------	-------
58	Rev A (completed)	Stephen Heppe, ADSI, Inc	2/22/02	Conditional relaxation of 3 second update rate at close ranges	YES (Draft DO-242A)	Table 3-4(a) Note 12
59	Rev A (completed)	James Maynard, UPS-AT	2/22/02	Consistent use of "NM" for abbreviation of nautical miles	YES (Draft DO-242A)	Entire Document
60	Rev A (completed)	Tony Warren, Boeing	2/22/02	Acquisition Range Requirements for Orthogonal Encounter Scenarios	YES (Draft DO-242A)	Table 3-4(a) Note 3

IP#	Current Status	IP Author	Last Action	Description	Text	Section
61	DEFERRED	Tom Mosher, UPS-AT	2/22/02	Need guidance on coping with duplicate A/V addresses	-------	-------
62	Rev A (completed)	Tom Mosher, UPS-AT	2/22/02	Delete note regarding transponder codes in A/V Address requirements.	YES (Draft DO-242A)	2.1.2.2.2 (Note 2)
63	DEFERRED	Tony Warren, Boeing	2/22/02	Broadcast conditions and operational concept for ARV reporting.	-------	-------
64	Rev A (completed)	Stuart Searight, FAA WJHTC	3/04/02	Creation of new Status Change On-Condition report.	YES (Draft DO-242A)	3.4.6
65	DEFERRED	Stuart Searight, FAA WJHTC	3/04/02	If both barometric and geometric altitudes are being broadcast, updating both at the State Vector rate should not be required.	-------	-------

DO-242A ADS-B MASPS
Change Summary

The following provides the reader of the Revision A of the DO-242 ADS-B MASPS document a summary of the areas of changes to the document. The areas indicated as "major re-write" deserve to be read in their entirety due to the significance of the revisions. These sections underwent either significant re-write as a result of re-organization or as a result of the addition of new material. Attempts were made to improve the clarify of the material and provide more definitive requirements to avoid misinterpretation by the reader.

Section Change Impact:

Section	Change
1.1 – 1.4	Minor changes for consistency
2.1 – 2.1.1.3	Minor changes for consistency
2.1.2 – 2.1.2.20	Major re-write
2.2 – 2.2.3.3.2	Minor changes for consistency
3.1 – 3.4.9.23.2	Major re-write
3.5 – 3.6.4	Minor changes for consistency
4.0	Updated
Appendix A	Updated
Appendix B	Updated
Appendix C	Updated
Appendix D	Updated
Appendix E	Updated
Appendix F	Minor changes for consistency
Appendix G	Minor changes for consistency
Appendix H	Revised constant alert time analysis
Appendix I	No Changes
Appendix J	Added altitude rate study
Appendix K	Minor changes for consistency
Appendix L	Minor changes for consistency
Appendix M	No changes
Appendix N	New Appendix
Appendix O	New Appendix
Appendix P	New Appendix
Appendix Q	New Appendix

<u>Changes by Topic:</u>

1) Separation of integrity and accuracy components of NUC_P into NIC, NAC, and SIL (IP's 8, 24, 39)
- Replacement of NUC with NIC and NAC as appropriate (throughout the document)
- Defined new navigation integrity and accuracy components
  - Navigation Integrity Category for Position (NIC) [§2.1.2.12]
  - Navigation Accuracy Category for Position (NAC_P) [§2.1.2.13]
  - Navigation Accuracy Category for Velocity (NAC_V) [§2.1.2.14]
  - Surveillance Integrity Level (SIL) [§2.1.2.15]
  - Barometric Altitude Quality Code (BAQ) [§2.1.2.16]
  - Barometric Altitude Integrity Code (NIC_{baro}) [§2.1.2.17]

2) TCP clarification and expanded definition of Intent Information requirements (IP's 26, 11, 21, 31, 45)
- TCP definition expanded to include 2-D RNAV waypoints, 3-D and 4-D TCPs, and level-offs [§2.1.2.19]
- Target State Reports (TSR's) used for Short term intent (i.e. target altitude, target heading/track angle) [§3.4.8]
- Trajectory Change Reports (TCR's) used for multiple flight segment parameters and TCP's [§3.4.9]

3) Re-organization of State Vector, Mode Status, and On-Condition Reports (IP 33)

- Clarify data element definitions (including minimum range, resolution, bit requirements) [SV §3.4.3, MS §3.4.4]
- Clarify data rate and acquisition range requirements [§3.3.3.1]
- Clarify data requirements by equipage class [§3.3.2]
- Addition of Status Change (SC) Report [§3.4.6]

4) Addition of new Air Referenced Velocity (ARV) Report (IPs 9, 27, 28, 37) [§3.4.7]

5) Correlate requirements to range of acquisition and operation, not potential applications. (IP 46) [§3.3.2, §3.3.3]

6) New requirements related to runway incursion alerting and surface operations (IPs 4, 14, 38)
- A 4-bit aircraft size characteristic will be broadcast [§2.1.2.3, §3.4.4.6]
- Own position data will be correlated to a defined "navigation reference center" for higher NAC levels [§2.1.2.5]
- Clarification of criteria for determination of airborne and on-ground states. [§3.4.3.1]

7) Deletion of original Note 7 for Table 3-4a (IP 35) [§3.3.3.1.1]

8) Revised Capability Class Codes (IPs 12, 32) [§2.1.2.10]

9) Revised Operational Mode Codes (IP 12) [§2.1.2.11]

10) Clarification of anonymous mode for ADS-B operations (IP 5)
- Address qualifier added to signify when 24-bit address is ICAO, anonymous, or other [§2.1.2.2.2.2]

11) Clarification of Aircraft/Vehicle Category codes (IP 6)
- Revised aircraft weight categories to harmonize with ICAO and US definitions [§2.1.2.2.3]
- Added codes to identify point obstacle, cluster obstacle, and line obstacle [§2.1.2.2.3]

12) Added Capstone Program identified improvements items (IPs 52, 53, 54)
- Added "IDENT" capability [§2.1.2.11]
- Added equivalent to transponder VFR(1200) code (Using ATC Services) [§2.1.2.11]
- Added "ALTITUDE OFF" capability [§2.1.2.6]

13) Added means to address backward compatibility (version codes) (IP 22) [§3.4.4.3]

14) Deleted "turn indication" requirement (IP 1) [§2.1.2.2, §3.2.1.1]